

WHAT IS CLAIMED IS:

1. An output regulator to convert an input voltage to a regulated output, comprising:

a power stage to generate a power output from the input voltage;

an output filter to filter the power output to generate the regulated output;

an output sensor to generate a digital sense signal to indicate within which of at least three reference ranges the regulated output is included, each of the at least three reference ranges including a plurality of possible values of the regulated output; and

a digital controller, responsive to the digital sense signal, to generate a drive signal to control the power stage.

2. The output regulator of Claim 1 wherein the power stage has a configuration selected from the group consisting of linear regulators and switching regulators.

3. The output regulator of Claim 2 wherein the power stage of the switching regulators is a topology selected from the group consisting of buck, boost, Cuk, zeta, buck-boost, and sepic.

4. The output regulator of Claim 1 wherein the digital sense signal represents a difference between a reference voltage and the regulated output.

5. The output regulator of Claim 2 further comprising a control mode selected from the group consisting of voltage mode and current mode.

6. The output regulator of Claim 5 wherein the digital controller to generate a duty cycle estimation to estimate the duty cycle of the drive signal.

7. The output regulator of Claim 6 further comprising a delay line to adjust the duty cycle estimation, the delay line to receive an input pulse signal corresponding to the duty cycle estimation and a select signal.

8. The output regulator of Claim 7 wherein the delay line includes an interpolator.

9. The output regulator of Claim 1 wherein the regulated output is selected from the group comprising output voltage and output current.

10. The output regulator of Claim 1 further comprising an output selector to set a nominal value of the regulated output.

11. The output regulator of Claim 10 wherein the output selector to generate a reference signal in response to an input, the reference signal to set the nominal value of the regulated output.

12. The output regulator of Claim 1 wherein the reference ranges are selected from the group consisting of overlapping and consecutive.

13. An output regulator to convert an input voltage to a regulated output, comprising:

means for generating a power output from the input voltage;

means for filtering the power output to generate the regulated output;

means for generating a digital sense signal to indicate within which of at least three reference ranges the regulated output is included, each of the at least three reference ranges including a plurality of possible values of the regulated output; and

18. The output regulator of Claim 17 wherein the means for generating the drive signal further includes means for generating a duty cycle estimation to estimate a duty cycle of the drive signal.

19. The output regulator of Claim 18 wherein the means for generating the duty cycle estimation further includes means for generating an incremental delay to adjust the duty cycle estimation.

20. The output regulator of Claim 13 wherein the regulated output is selected from the group comprising output voltage and output current.

21. The output regulator of Claim 13 further comprising means for setting a nominal value of the regulated output.

22. The output regulator of Claim 21 wherein the means for setting the nominal value further includes means for generating a reference signal in response to an input, the reference signal to set the nominal value of the regulated output.

23. The output regulator of Claim 13 wherein the reference ranges are selected from the group consisting of overlapping and consecutive.

24 A method of generating a regulated output from an input voltage, comprising:

generating a power output from the input voltage;
filtering the power output to generate the regulated output;

generating a digital sense signal to indicate within which of at least three reference ranges the regulated output is included, each of the at least three reference ranges including a plurality of possible values of the regulated output; and

generating a drive signal, in response to the digital sense signal, to control the power stage.

25. The method of Claim 24 wherein the power stage has a configuration selected from the group consisting of linear regulators and switching regulators.

26. The method of Claim 25 wherein generating the power output includes using a topology selected from the group consisting of buck, boost, Cuk, zeta, buck-boost, and sepic.

27. The method of Claim 24 wherein generating the digital sense signal includes determining a difference between a reference voltage and the regulated output.

28. The method of Claim 25 further comprising a control mode selected from the group consisting of voltage mode and current mode.

29. The method of Claim 28 wherein generating the drive signal further includes generating a duty cycle estimation to estimate the duty cycle of the drive signal.

30. The method of Claim 29 wherein generating the duty cycle estimation further includes generating an incremental delay to adjust the duty cycle estimation.

31. The method of Claim 24 wherein the regulated output is selected from the group comprising output voltage and output current.

32. The method of Claim 24 further comprising setting a nominal value of the regulated output.

33. The method of Claim 32 wherein setting the nominal value further includes generating a reference signal in response to an input, the reference signal to set the nominal value of the regulated output.

34. The method of Claim 24 wherein the reference ranges are selected from the group consisting of overlapping and consecutive.